Application Brief

On-wafer Device Characterization Measurement Challenges

Balancing Accuracy and Throughput for Broadband Measurements

Semiconductor manufacturing test engineers face increased challenges today related to broadband millimeter wave (mm-wave) on-wafer testing. Developing accurate models often requires measuring frequencies that range from near DC up to 110+ GHz and higher.. Achieving accurate, stable measurements over extended time periods is a challenge for foundries and for fab-less semiconductor companies that require extensive testing of on-wafer devices.

Today's Challenges:

Maximizing Your Frequency Range	Accurate models require characterizing your device across the widest possible frequency range in order to avoid simulation convergence issues. Single sweep measurements need to start at the lowest possible frequency and continue all the way to 110 GHz or more.
Minimizing Accuracy/Speed Tradeoffs	The many parameters that are measured during device characterization must be accurate to ensure proper specifications are set for a device. In production, minimizing test time must be balanced with ensuring proper pass/fail binning.
Poor Stability Increases Calibration Frequency	Lack of calibration stability and resultant drift with older-style systems requires frequent calibrations during extensive testing of on-wafer devices. This consumes valuable device characterization time and reduces throughput during production.
Protecting Early Prototypes	Making the most out of your prototypes can play an important role in getting to market. Unknown and unstable power levels can damage devices under test.
Size and weight constraints	Traditional broadband measurement solutions have required bulky test heads which often need special wafer probe stations and fixtures to properly support and position. Not only does this increase the cost of your test station, but added coaxial cable path lengths can also reduce performance and stability.

Bulky old-style WG/coax hybrid broadband systems impact measurement stability

Opportunity to improve measurement efficiency during Device Characterization

	1 Cal per Hour (x4)	1 Cal per 4 hour Session
Cal Time (min)	20	20
Overall Cal Time (min)	80	20
Total Session Test Time (min)	160	220
Measurement Efficiency	67%	92%
Efficiency Improvement		38%

envision : ensure

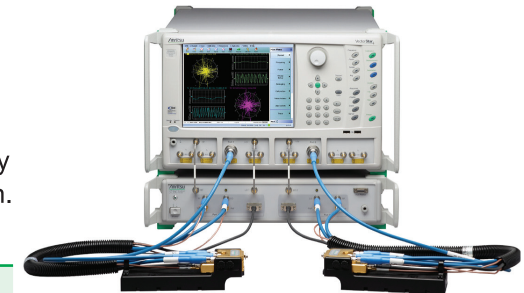
Application Brief

On-wafer Device Characterization Measurement Solutions

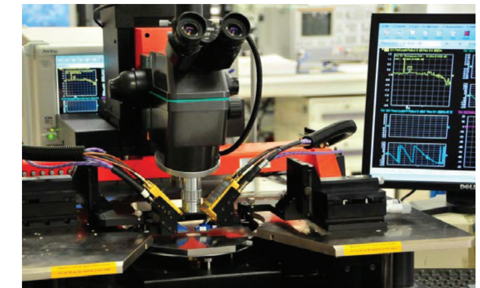
Achieving Both Accuracy and Throughput for Broadband Measurements

The Anritsu VectorStar™ ME7838 Series has been uniquely designed to meet your on-wafer device characterization needs from 70 kHz to 110, 125 or 145 GHz depending on model (and even up to 1.1 THz with VDI or OML modules). It allows semiconductor test engineers to achieve accurate, stable measurements over extended time periods. The improvement in measurement efficiency allows them to better characterize devices, more confidently set product specifications and test more products during production. If required, options for true mode stimulus differential and pulse measurements are available.

Feature	Benefit
Broadest Frequency Span 70 kHz to 145 GHz	• Obtain the most thorough and accurate broadband measurements • Accurate low frequency measurements eliminate the time consuming, error prone concatenation process across the RF, microwave, and millimeter-wave bands
Industry Leading Performance and Speed	• Widest dynamic range of 108 dB at 67 GHz and 109 dB at 110 GHz • Direct-connect to probes further enhances overall system performance • Fastest measurement speed of 110 ms for 401 points at 10 kHz IFBW
Extend Test time by Reducing Calibration Frequency	• Compact integrated frequency extension modules provide enhanced stability as compared with old-style hybrid WG/coax modules • S_{21} stability better than 0.1 dB and 0.5 degree over 24 hours • Improved stability allows for a single calibration to be performed once for a four hour session or even once a day, resulting in an increase in measurement test time of over 37% in a single four hour session!
Only Broadband VNA System with Real-Time Power Leveling	• Protect sensitive devices with power sweep control that provides the best power accuracy and stability to power levels as low as –55 dBm • Real time power leveling is more responsive than systems using software leveling. (also works with VDI and OML Frequency Extenders if added to cover higher mm-wave bands) • Real-time power level control of up to 55 dB enables accurate linear gain and 1 dB compression measurements.
Smallest/lightest mm-wave Modules	• Compact, lightweight broadband modules for easy, precise, and economical positioning on the wafer probe station • Direct mounting to probes minimizes cable loss and improves both performance and stability

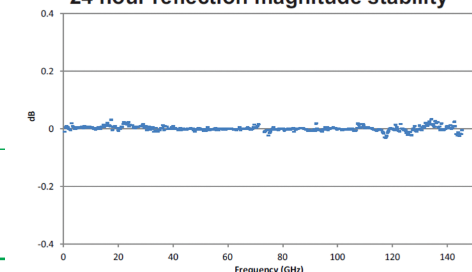


ME7838D VectorStar
70 kHz to 145 GHz
Easily mount on any probe station and may be mounted directly to the probe



Improved measurement stability enables less frequent calibrations

24 hour reflection magnitude stability



envision : ensure

Pricing | Ordering | Training | Support

www.anritsu.com or 1-800-267-4878

® Anritsu All trademarks are registered trademarks of their respective companies.
Data subject to change without notice. For the most recent specifications visit: www.anritsu.com

11410-00689, Rev. B Printed in United States 2014-04
©2014 Anritsu Company. All Rights Reserved.